

two thirds as long as the eye; in a Sprat 35, also two thirds as long as the orbit; and in a Pilchard 71, longer than the eye. Thus these appendages in number in the hybrid (61) were less than in the Pilchard (71), but more than in the Herring (48) or in the Sprat (35); while their length did not quite equal that of a normal Pilchard. As to the character of these gill-rakers in the Pilchard, Sprat, and Herring: in the first the lateral denticulations are very minute, a little larger in the Sprat, and largest in the Herring; to which last those in the hybrid had the greatest affinity. *Fins*.—In the hybrid the distance from the end of the snout to the commencement of the dorsal fin was 3·4 inches, the entire extent of the base of the fin being inserted midway between the snout and the root of the caudal fin; lower lobe of the caudal the longer; anal rays almost hidden by the scales. *Scales*.—The number of scutes 22 before and 14 behind the base of the ventral fin; they are weak. As regards the scales, two large rows exist just behind the head on the left side, and the remainder resemble to a great extent those of the Herring, but with the semicircular striæ of the Pilchard. The scales on the right side are similar to those normally seen in the Pilchard. The number of scales along the body in Pilchards is from 29 to 30, in about 8 vertical rows, 17–18 scutes before the ventral fin and 14 behind it; in the Sprat 47 scales along the body in 13 rows, 21–23 strong scutes before the ventral fin and 11–12 behind it; in the Herring the numbers of rows of scales along the body vary from 53–60, and there are 13 scutes behind the ventral fin. *Colours*.—On the left side was seen the beautiful purplish-golden hues of the Herring, but on the right side were the silvery colours of the Pilchard.

#### SALMO PURPURATUS.

This specimen, which is 8·5 inches long, died at South Kensington in August 1885. It was one of the fishes raised from the eggs brought over from Canada by Mr. Wilmot in 1883, which were described in the Society's 'Proceedings' for 1884, p. 24. Originally imported as supposed eggs of the Salmon, the edge of the adipose dorsal fin in the fry showed the orange tints of a Trout, while the par-bands were from 7 to 10 and averaged  $8\frac{1}{4}$ . It is interesting, because specimens have been turned into the Thames, and were asserted to be *Land-locked Salmon*, which is an error of identification.

#### 10. Notes on the *Peripatus* of British Guiana.

By W. L. SCLATER, B.A., F.Z.S.

[Received January 31, 1887.]

During my recent stay in Demerara I was fortunate enough to procure a considerable number of specimens of a species of *Peripatus*. This singular form was first discovered in British Guiana by Mr. im Thurn, who sent examples home to Prof. Moseley. But the bottle containing the specimens was broken before arriving in England, and

the contents were dried up. Of the *Peripati* which I obtained twenty individuals were brought to England alive, but were unfortunately found to be much affected by the cold, and were therefore killed and preserved immediately on arrival. I also brought with me four other specimens that had been preserved in British Guiana.

All the specimens which I obtained were females, and all of them contained embryos. All the specimens examined, both large and small, including those taken from the uterus, were found to have 30 pairs of legs, and of course a pair of oral papillæ. In this respect they differ from the form of *Caraccas* described by Ernst, in which, as he states, the young ones have only 29 pairs of legs, while the adult specimens possess 31 pairs. The colour of the Demeraran *Peripatus* is a dark brick-red above and pinkish below with a dark suffused median line on the dorsal surface, such as Ernst (25) described in his specimens. The antennæ are very much darker than the rest of the body, in fact they are quite black. The body, as in all other forms of *Peripatus*, is divided into numerous rings by lines of small warts, about 10 to 12 rings going to each segment; the legs and antennæ are also ringed, and the former bear the usual pair of hooks.

In the living animal the colour is intermediate between the colour of the two specimens now exhibited—that preserved in spirit being of a darker, and that preserved in Pereney<sup>1</sup> fluid being of a lighter hue, than that of the living animal. The adult specimens vary from 2.25 to about 2.50 inch in length. It is useless to give exact measurements, since not only do the animals contract when preserved in spirit, but even the living animals vary greatly in size at different times.

The question as to what species the Demeraran *Peripatus* should be referred to is by no means an easy one. Specimens of *Peripatus* have been obtained from the following places in the West Indies and South and Central America:—

- (1) St. Vincent's, W. I. ; with 33 pairs of legs. Guilding (1).
- (2) Cayenne ; with 29 pairs of legs. Audouin and Milne-Edwards (2)
- (3) Lake of Valencia, Venezuela. Wiegmann (4).
- (4) Chili. Gay (12).
- (5) St. Thomas, W. I. Moritz (5).
- (6) Colonia de Tovar, Venezuela. Grube (11).
- (7) Santarem, Amazons ; 31 pairs of legs. Moseley (22).
- (8) Nicaragua. Belt (17).
- (9) Caraccas, Venezuela. Ernst (25).
- (10) Trinidad (2 species). Kennel (30) and (31).
- (11) Island of Marajo, Amazons. Branner (34).
- (12) Dominica. Bell (28).
- (13) Porto Rico. Peters (23).

*P. torquatus*, a species discovered by Kennel (31) in Trinidad, and described by him, is easily distinguished by its large size (15 mm.), the number of its pairs of legs (41–42), and by its yellow

<sup>1</sup> Pereney fluid is a hardening fluid composed of chromic acid .5 p. c. sol., 3 parts ; nitric acid 10 p. c. sol., 4 parts ; spirit 90 p. c., 3 parts.

collar. *P. blainvillii*, the species described by Gay from Chili, seems also to be distinct, as possessing only 19 pairs of legs.

All the other forms from the above-mentioned localities, including Kennel's second species from Trinidad, seem, so far as one can judge from the descriptions, to resemble one another very closely, except as regards slight variations in the number of pairs of legs. Thus Guilding's species (*P. juliformis*) is described as possessing 33 pairs of legs; while the form from Caraccas is said by Dr. Ernst to have 31 pairs in the adult, and only 29 when first born. All my specimens from Demerara of all ages agree in having 30 pairs of legs.

Another point in which the Demeraran form seems to differ from the other forms described is that the colour of the antennæ is black. This point is not specially mentioned in the descriptions of the other American *Peripati*.

I have also examined the examples of *Peripatus* in the British Museum. Of all the examples of the genus in the National collection there is only one specimen which seems to resemble my form; it is that labelled "*Peripatus* from Dominica, found under logs." The animal in question was obtained in Dominica and presented to the British Museum by the late Mr. G. F. Angas, C.M.Z.S., and has been noticed by Prof. F. Jeffrey Bell (28).

The *Peripatus* from Dominica resembles the Demeraran form in the following points:—the black antennæ; the general colour, so far as can be judged from the spirit-preserved specimens; the number of legs (30 pairs); and also in another point which I have not hitherto mentioned, but which seems to offer characters useful for distinguishing the various species: this is the shape of the slits on the under surface of the feet.

In all the American specimens examined by me at the British Museum this slit is split-shaped; but in my specimens and in that from Dominica the openings are in many cases rounded, and sometimes have attached to them a bladder-shaped appendage, as mentioned by Prof. Bell (28).

It seems to me therefore that there are only three species of *Peripatus* yet satisfactorily determined in South America.

1. *P. torquatus*, Kennel, from Trinidad.
2. *P. blainvillii*, Gay, from Chili.
3. *P. edwardsi*, Blanchard (= *juliformis*, Guilding?), from Cayenne, British Guiana, Venezuela, Nicaragua, and several of the West-India Islands.

To these three species must be added a fourth, from Dominica and British Guiana, distinguished by the following points:—

- (1) The black antennæ.
- (2) Thirty pairs of feet and one pair of oral papillæ.
- (3) The darker and redder colour; the other forms being a dirty brown colour as far as can be seen in the spirit specimens.
- (4) The rounded openings to the foot-pits.
- (5) The black marking in the median dorsal line in these forms, which is much more definite than in any of the others from South America.

I do not give a name to this Dominican and British-Guianan *Peripatus*, since I understand that Mr. Sedgwick is about to publish a monograph on the species of the genus *Peripatus*, and will include in his work a description of the specimen from Dominica in the British Museum.

All the specimens of *Peripatus* obtained by me were found, with one exception, in the grounds round Mr. im Thurn's house, Maccasseema, on the Pomeroon River. Maccasseema is situated on the top of a sand-hill about 30 feet above the river, and is surrounded on all sides by the swampy forest, except in front, where it faces the river. The specimens were all found under rotten logs of wood, or under the decaying stalks of the Cokerite Palm (*Maximiliana martiana*). I never saw one actually in the rotten wood, as has been described by some previous observers.

The single exception was found about a mile from Maccasseema, up a creek running into the river Pomeroon. This individual was also found under a more or less rotten log close to an Indian house.

Specimens of *Peripatus* were exceedingly scarce, and it took a long time to collect even the few I brought home.

I should mention that examples of *Peripatus* have also been obtained in Demerara by Mr. Quelch, the Curator of the Georgetown Museum, who found them about twenty miles from Georgetown on the Hoorubea Creek (36).

In offering these preliminary notes on this most interesting animal, I have not entered into further details, because Prof. Moseley and Mr. Sedgwick are about to publish an account of the different species of *Peripatus*, and will incorporate their observations on the present form into their work. But before concluding I must express my thanks to Mr. im Thurn for all the help he gave me in my collecting, more especially for allowing me the use of Douglas, the captain of his Indian boat's crew, as collector, for to his sharp eyes I owe most of my specimens.

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#### APPENDIX.

The numbers appended to the authors' names in this paper refer to the following list of publications, which forms, I believe, a nearly complete bibliography of original works on *Peripatus*. To most of the titles I have added a few remarks explaining the contents of the memoirs. The publications that I have not been able to examine at first hand are marked with an asterisk.

- (1) GUILDING, L. *Mollusca Caribbaeana*; an account of a new genus of Mollusca. *Zool. Journ.* ii. pp. 443-444, pl. xiv. 1826.

Contains the original description of the genus *Peripatus* and species *P. juliformis*, found by the author in the forests of St. Vincent. The author considered it an aberrant form of slug. A fair coloured plate is given.

- (2) AUDOUIN et MILNE-EDWARDS. Classification des Annélides, etc. Ann. Sc. Nat. xxx. pp. 411-414, pl. xxii. 1833.

The authors show that *Peripatus* must be placed among the "Annélides Errantes." The specimens described were obtained from the River Appronague, in Cayenne.

- (3) GERVAIS, P. Études pour servir à l'histoire naturelle des Myriapodes. Ann. Sc. Nat. (2) vii. pp. 35-60. 1837.

The author believes *Peripatus* to be a transitional form between the Myriapods and Chætopods; he also quotes a MS. description by Blainville of a second species (*P. brevis*) from the Cape of Good Hope.

- (4) WIEGMANN, A. F. A. Einige Bemerkungen über Guilding's *Peripatus*. Arch. f. Nat. (Wiegmann), iii. pp. 195-200. 1837.

Description of certain specimens of *Peripatus* from the Lake of Valencia, in Venezuela.

- (5) MORITZ, C. Noch einige Worte über *Peripatus*, Guild. Arch. f. Nat. (Wiegmann), v. pp. 175-176. 1839.

Remarks on the habits and life-conditions of specimens of *Peripatus* found in St. Thomas.

- (6) DE BLAINVILLE. Dictionnaire des Sciences Naturelles. Supplément, tom. i. p. 237. Paris, 1840.

In his article "Animal" de Blainville institutes a special division, "Les Malucopodes" of his Type ii. "Entomozoaires," for the genus *Peripatus*.

- (7) MILNE-EDWARDS, H. Note sur le *Péripate juliforme*. Ann. Sc. Nat. (2) xviii. pp. 126-128. 1842.

The author reiterates his opinion of the Annelidan nature of *Peripatus*.

- (8) BLANCHARD, E. Recherches sur l'organisation des Vers. Ann. Sci. Nat. (3) viii. pp. 119-149. 1847.

On pp. 137-141 is given the history of the four species known at that time—*P. juliformis*, *edwardsi*, *blainvillii*, and *brevis*. The form is considered by the author to be related to Annelids.

- (9) QUATREFAGES, A. DE. Mémoire sur la famille des Hermelliens. Ann. Sci. Nat. (3) x. pp. 5-58. 1848.

Quatrefages (p. 56) considers *Peripatus* to be a worm of aberrant form, distinctly related to this group (e. g. *Hermelleu*).

- (10) MILNE-EDWARDS, QUATREFAGES, et BLANCHARD. Recherches anatomiques et zoologiques fait pendant un voyage sur la côte de Sicile, part iii. p. 61, pl. i. fig. 2. Paris, 1849.

Blanchard forms a new species (*P. edwardsi*) for the reception of Milne-Edwards's form from Cayenne; he also mentions Gay's species, *P. blainvillii*, afterwards described (12), and gives some account of its anatomy.

- (11) GRUBE, E. Untersuchungen über den Bau von *Peripatus edwardsii*. Müller's Arch. Anat. Phys. 1853, pp. 322-360, Taf. ix., x. 1853.

A description of the anatomy of *Peripatus* from specimens obtained at Colonia de Tovar, in Venezuela.

- (12) GAY, C. Historia fisica y politica de Chile. Fauna, Vol. iii. Atlas, Annelides, Lam. iii. fig 2. 1854.

On page 58 is a description of a new species (*Peripatus blainvillii*), with 19 pairs of legs, from Chile. In the Atlas, it may be observed, this species is figured with varying numbers of pairs of legs, in one case 30 and another 29.

- (13) QUATREFAGES, A. DE. Histoire Naturelle des Annelés. Tome ii. Paris, 1865. 8vo.

On page 675 is an account of the genus *Peripatus* and of the species then known.

- (14) GRUBE, E. Reise der österreichischen Fregatte Novara. Zool. Theil ii. Anneliden. Wien, 1867.

Description of *P. capensis* found near Constantia at the Cape. See p. 4, pl. iv. figs. 3, 4a.

- (15)\* SANGER. Description of a *Peripatus* from Australia. Transactions of the Russian Assembly of Naturalists, held at Moscow in 1867. Moscow, 1869.

Description of *P. leuckarti* from Australia, and of the anatomy of *P. capensis*, in Russian.

- (16) LEUCKART. Bericht üb. Leist in d. Naturgeschichte der Niederen Thiere während der J. 1868-1869. Arch. f. Nat. (Troschel), xxxv. pt. 2, pp. 277-278. 1869.

A résumé of Sanger's paper, containing an account of the anatomy of *Peripatus capensis* and of the new species from Australia, *Peripatus leuckarti*.

- (17) BELT, T. The Naturalist in Nicaragua. 8vo. London, 1874.

Mention is made (p. 140) of *Peripatus* in Nicaragua, though not by name. The specimen procured by Belt was afterwards identified by Prof. Moseley (22).

- (18) MOSELEY, H. N. On the Structure and Development of *Peripatus capensis*. Phil. Trans. clxiv. pls. lxxii.-lxxv. pp. 757-782; and Proc. R. S. xxii. pp. 344-350. 1874.

General account of the anatomy and development of the Cape species of *Peripatus* from specimens obtained during the 'Challenger' Expedition.

- (19) HUTTON, F. W. On *Peripatus novæ-zealandiæ*. Ann. Mag. N. H. (4) xviii. pl. xvii. pp. 361-369, 1876; also *op. cit.* (4) xx. pp. 81-83, 1877; and *op. cit.* (5) i. pp. 204-206, 1878.

Description of the New-Zealand species of *Peripatus*, with an

account of its habits and anatomy, and a few words on its development.

- (20) MOSELEY, H. N. Remarks on Observations by Capt. Hutton, Director of the Otago Museum, on *Peripatus novæ-zealandiæ*, with notes on the Structure of the Species. Ann. Mag. N. H. (4) xix. pp. 85-91. 1877.

A criticism of Hutton (19), with additional remarks on several points in the anatomy of *P. novæ-zealandiæ* not mentioned by him.

- (21) BALFOUR, F. M. On certain Points in the Anatomy of *Peripatus capensis*. Proc. Cambr. Phil. Soc. iii. pp. 266-269; Quart. J. Micr. Sc. xix. pp. 431-433. 1879.

Description of the renal segmental organs and of certain points in the anatomy of the nervous system of *Peripatus*.

- (22) MOSELEY, H. N. Notes on the Species of *Peripatus*, and especially on those of Cayenne and the West Indies. Ann. Mag. N. H. (5) iii. pp. 263-267. 1879.

Contains a history of the genus and a discussion as to the number of species in South America; also notes on two specimens, one from Santarem, on the Amazons; the other from Nicaragua, collected by Mr. Thomas Belt (17).

- (23) PETERS, W. Ueber die Arten von *Peripatus*. SB. nat. Fr. Berlin, 1880, pp. 28-29. 1880.

A short account of the species then known (four), and remarks on the variation of the number of pairs of legs. Records the existence of specimens in the Berlin Museum from Porto Rico, Surinam, and Venezuela.

- (24) PETERS, W. Die Variation der Fusszahl bei *Peripatus capensis*, Grube. SB. nat. Fr. Berlin, 1880, pp. 165-166. 1880.

Records the variation in the number of pairs of legs in a series of *Peripatus* from the Cape of from 22 to 17 pairs.

- (25) ERNST, A. Some remarks on *Peripatus edwardsii*, Blanch. Nature, xxiii. pp. 446-448. 1881.

An account of specimens found at Caraccas, in Venezuela.

- (26) MOSELEY, H. N., and SEDGWICK, A. Note on a discovery, as yet unpublished, by the late Professor F. M. Balfour, concerning the existence of a Blastopore, and on the Origin of the Mesoblast in the Embryo of *Peripatus capensis*. Proc. R. S. xxxiv. pp. 390-393. 1882.

- (27) BALFOUR, F. M. The Anatomy and Development of *Peripatus capensis*; edited by Prof. H. N. Moseley and A. Sedgwick. Quart. J. Micr. Sc. xxiii. pp. 213-259, pls. xiii.-xx. 1883.

Description of the anatomy and some account of the development, with a coloured plate, of *P. capensis*.

- (28) BELL, F. J. Note on a *Peripatus* from the Island of Dominica, West Indies. Ann. Mag. N. H. (5) xi. p. 388. 1883.

- (29) GAFFRON, E. Beiträge zur Anatomie und Histologie von *Peripatus*. Zool. Beitr. (Schneider), i. Taf. vii.–xii. pp. 33–60. 1883. Also *tom. cit.* Taf. xi., xii., xiii., pp. 145–162. 1885.  
Account of the anatomy and more particularly the histology of *Peripatus edwardsii* from Trinidad, with 32 pairs of legs.
- (30) KENNEL, J. Entwicklungsgeschichte von *Peripatus*. Zool. Anz. vii. pp. 531–537. 1883.  
A preliminary notice, containing a description of *P. torquatus* from Trinidad.
- (31) KENNEL, J. Entwicklungsgeschichte von *Peripatus edwardsii*, Blanch., und *Periptaus torquatus*, n. sp. Theil I. Mit Taf. v. bis xi. Arbeit. zool.-zoot. Inst. Würzburg, vii. pp. 95–228. 1885. Theil II. Mit Taf. i. bis vi. Arbeit. zool.-zoot. Inst. Würzburg, viii. pp. 1–93. 1886.  
An account of the development of the American species of *Peripatus*, which are characterized by the absence of food-yolk in the ova, and by the presence of a (so-called) placenta. The specimens examined were obtained from Trinidad.
- (32) SEDGWICK, A. On the Fertilized Ovum and Formation of the Layers of the South-African *Peripatus*. Proc. Roy. Soc. xxxix. pp. 239–244. 1885.  
Preliminary account of no. (33).
- (33) SEDGWICK, A. The Development of the Cape Species of *Peripatus*. Part I., with pls. xxxi., xxxii. Quart. J. Micr. Sc. xxv. pp. 449–446. 1885. Part II., with pls. xii.–xiv. Quart. J. Micr. Sc. xxvi. pp. 175–212. 1886.  
The first part contains the first mention of *P. balfouri*, distinguished by having 18 pairs of legs; it also contains an account of the generative organs, segmentation, and general development of the embryo. Part II. contains a further account of segmentation and early stages.
- (34) BRANNER, J. C. *Peripatus* in the Island of Marajo, Amazonas. Nature, xxxiv. p. 496. 1886.
- (35) HORST, R. On a specimen of *Peripatus*, Guild., from Sumatra. Notes Leyd. Mus. viii. pp. 37–41, pl. ii. figs. 1–5. 1886.  
Description of a specimen of *Peripatus* with 24 pairs of claw-bearing legs, from Sumatra.
- (36) QUELCH, J. J. *Peripatus* in Demerara. Nature, xxxiv. p. 288. 1886.
- (37) STUHLMANN, F. Die Reifung des Arthropodeneis. Pp. 1–128, Taf. i.–iv. Freiburg-i.-B. 1886. 8vo.  
Account of the ovary and ovarian ovum of *P. edwardsii*. Pp. 89–93.
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